REMARKS

Claims 1-13 are all the claims pending in the application. Claims 3 and 4 have been rejected under § 112 (second paragraph) as being indefinite. Additionally, claims 1, 2, 5, 7-10 and 12 have been rejected under § 102(b) as being anticipated by Colombeli, et al. Further, claims 11 and 13 have been rejected under § 103 as being unpatentable over Colombeli, et al.; and claim 6 has been rejected under § 103(a) as being unpatentable over Colombeli, et al. in view of Sirtori, et al.

With respect to the § 112 (second paragraph) rejection of claims 3 and 4, these claims have been amended herein to address the Examiner's comments. With respect to the Examiner's assertion that the specification describes that the modulus of (ε_1) is matched to the dielectric constant (ε_2) of the surrounding material (page 3, first paragraph of the Office Action), Applicants submit that, in fact, a person of ordinary skill in the art would immediately understand that the comparison is made between *the modulus* of (ε_2) and *the modulus* of (ε_1). It is with this in mind that the Applicants have amended claim 3 above. Support for this can be found at page 8, third paragraph of the specification. In view of the foregoing, it is respectfully submitted that the § 112 (second paragraph) rejection has been overcome.

Turning to the prior art rejections, in view of the above amendment to claim 1, it is submitted that claim 1 patentably distinguishes over Colombeli, et al.

In more detail, claim 1 has been amended to recite that the mode intensity of the plasmon modes in proximity to the second interface (16b) is comparable to the mode intensity of the plasmon modes in proximity to the first interface (16a). Support for this can be found in Figures 2 and 3 of the specification. Applicants submit that the semiconductor laser, as recited in claim 1, is significantly and patentably different from that disclosed in the Colombeli,et al. article.

First of all, Applicants submit that the material parameters are very different in the present application from that of Colombeli, et al. The material used is InGaAs which has a lower electron mass than GaAs (0.0427 against 0.067) thereby giving a much higher plasma frequency for the same doping concentration. Furthermore, according to one of the authors which coauthored Colombeli, et al., the n++ doping of Colombeli, et al. is approximately 5×10^{19} cm^3, one order of magnitude larger than the present application.

The operating wavelength is also very different, 21 μm in the Colombeli, et al. compared to 67 μm in the present application, a relevant point since instead the active regions and doped layers are similarly thick (obviously you have to relate the thickness to the wavelength to draw proper comparisons).

Furthermore, the substrate is also very different being n- doped InP in Colombeli, et al. and undoped GaAs in the present application. This is an important point to understand the different operational concepts of the respective waveguides. In the Colombeli, et al. the doped InP substrate presents a relatively strong absorption of the laser light, owing mainly to free carrier absorptions. As such, the buried doped InGaAs layer is designed to be as metallic as possible in order to have the least feasible penetration of the guided mode into the substrate. In fact, a computation of the latter yields approximately only 1×10^{-5} of the total mode intensity present in the substrate. Unfortunately, as the doped layer is not metallic enough, it is the intensity of the mode in this layer (together with the penetration in the top contact) to be not negligible, giving still rise to high fosses. It is precisely because of this issue that such concept was never implemented successfully in the THz range as its losses were measured to be too high to be compatible with laser operation (*See*, M. Rochat et al., already on file).

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On the other hand the concept proposed in the present application relies on letting the mode expand freely in the substrate and tuning the doping of the buried layer so as to achieve an optimal balance between mode width and optical losses (mainly due to the amount of mode intensity in the doped layer).

In view of the foregoing, Applicants respectfully submit that the claims presently pending in the application patentably distinguish over the cited art. It is therefore respectfully requested the application be passed to issue at the earliest possible convenience. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,

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